

(19)



Eur päisch s Pat ntamt

European Patent Office

Office européen des brevets



(11)

EP 1 059 629 A3

(12)

## EUROPEAN PATENT APPLICATION

(88) Date of publication A3:  
27.03.2002 Bulletin 2002/13

(51) Int Cl.7: G11B 5/66

(43) Date of publication A2:  
13.12.2000 Bulletin 2000/50

(21) Application number: 00304517.6

(22) Date of filing: 26.05.2000

(84) Designated Contracting States:  
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE  
Designated Extension States:  
AL LT LV MK RO SI

(30) Priority: 08.06.1999 JP 16132999  
07.04.2000 JP 2000107075  
07.04.2000 JP 2000107071  
07.04.2000 JP 2000107076  
07.04.2000 JP 2000107074  
07.04.2000 JP 2000107072

(71) Applicant: FUJITSU LIMITED  
Kawasaki-shi, Kanagawa 211-8588 (JP)

(72) Inventors:  
• Abarra, E. Noel c/o Fujitsu Ltd  
Kawasaki-shi, Kanagawa 211-8588 (JP)  
• Okamoto, Iwao c/o Fujitsu Limited  
Kawasaki-shi, Kanagawa 211-8588 (JP)

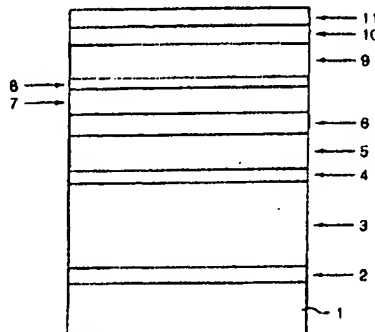
- Mizoshita, Yoshifumi c/o Fujitsu Ltd.  
Kawasaki-shi, Kanagawa 211-8588 (JP)
- Yoshida, Yuki Fujitsu Ltd  
Kawasaki-shi, Kanagawa 211-8588 (JP)
- Umeda, Hisashi c/o Fujitsu Ltd.  
Kawasaki-shi, Kanagawa 211-8588 (JP)
- Suzuki, Masaya c/o Fujitsu Ltd  
Kawasaki-shi, Kanagawa 211-8588 (JP)
- Akimoto, Hideyuki c/o Fujitsu Ltd.  
Kawasaki-shi, Kanagawa 211-8588 (JP)
- Sato, Hisateru c/o Fujitsu Ltd.  
Kawasaki-shi, Kanagawa 211-8588 (JP)
- Kaitu, Isatake c/o Fujitsu limited  
Kawasaki-shi, Kanagawa 211-8588 (JP)

(74) Representative: Fenlon, Christine Lesley et al  
Haseltine Lake & Co.,  
Imperial House,  
15-19 Kingsway  
London WC2B 6UD (GB)

(54) Magnetic recording medium, magnetic storage apparatus, recording method and method of producing magnetic recording medium

(57) A magnetic recording medium is provided with at least one exchange layer structure, and a magnetic layer (9) formed on the exchange layer structure. The exchange layer structure includes a ferromagnetic layer (7) and a non-magnetic coupling layer (8) provided on the ferromagnetic layer (7) and under the magnetic layer (9).

FIG.1



EP 1 059 629 A3



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 00 30 4517

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 851 643 A (HONDA ET AL.) 22 December 1998 (1998-12-22)	1-7, 9, 11, 21-31	G11B5/66
Y	* column 5, line 50 - line 54 *	10, 12-18, 20, 32-34	
	* column 6, line 12 - line 18 *		
	* column 6, line 66 - column 7, line 9 *		
	* column 8, line 12 - line 25 *		
	* column 15, line 31 - line 56 *		
	* column 22, line 4 - line 16; figures 1A, 7, 10 *		
	----		
X	DE 197 00 506 A (FUJI ELECTRIC) 17 July 1997 (1997-07-17)	1, 3, 5-8	
	* column 2, line 66 - column 3, line 31 *		
	* column 4, line 16 - line 22; claim 1; figures 1, 7 *		
	----		
X	EP 0 892 393 A (IBM) 20 January 1999 (1999-01-20)	1, 3-7	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
	* column 1, line 26 - line 29 *		G11B
	* column 4, line 25 - line 58 *		
	* column 5, line 7 - line 45 *		
	* column 7, line 12 - line 18; claims 7, 9, 11; figure 2 *		
	----		
Y	US 5 147 732 A (SHIROISHI ET AL.) 15 September 1992 (1992-09-15)	10, 12-18, 20	
	* column 17, line 64 - column 18, line 23 *		
	* column 23, line 3 - line 57; claim 1; figures 1, 3 *		
	----		
Y	US 5 843 569 A (KAITSU ET AL.) 1 December 1998 (1998-12-01)	32-34	
	* claims 1, 2 *		
D	& JP 10 092637 A 10 April 1998 (1998-04-10)		
	-----		
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>5 February 2002</b>	Examiner <b>Magrizos, S</b>
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention F : earlier patent document, but published on, or after the filing date I : document cited in the application L : document cited for other reasons A : technological background O : non-written disclosure P : intermediate document 8 : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 4517

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

05-02-2002

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5851643	A	22-12-1998	JP	7134820 A	23-05-1995
			JP	7134801 A	23-05-1995
			JP	7176027 A	14-07-1995
DE 19700506	A	17-07-1997	JP	9198641 A	31-07-1997
			DE	19700506 A1	17-07-1997
			US	5851656 A	22-12-1998
EP 892393	A	20-01-1999	US	6077586 A	20-06-2000
			EP	0892393 A1	20-01-1999
			JP	3224779 B2	05-11-2001
			JP	11073621 A	16-03-1999
			SG	71130 A1	21-03-2000
US 5147732	A	15-09-1992	JP	2168418 A	28-06-1990
			JP	2865731 B2	08-03-1999
US 5843569	A	01-12-1998	JP	10092637 A	10-04-1998

EPC-SEARCH

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82